



**UNITED STATES DEPARTMENT OF COMMERCE
Patent and Trademark Office**

Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/004,524	01/08/98	GEDNEY	R EN9-91-022R-

MM32/0302
DRIGGS, LUCAS, BRUBASKER & HOGG CO., LPA
OLD VILLAGE HALL
8383 MENTOR AVENUE
MENTOR OH 44060

EXAMINER

VIGUSHIN, J

ART UNIT

PAPER NUMBER

2835

DATE MAILED:

03/02/00

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/004,524

Applicant(s)

Gedney et al.

Examiner

John Vigushin

Group Art Unit

2835



☒ Responsive to communication(s) filed on Oct 14, 1999

☒ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

Disposition of Claims

☒ Claim(s) 1-12, 21-25, and 34 is/are pending in the application.

Of the above, claim(s) _____ is/are withdrawn from consideration.

☒ Claim(s) 1-12 is/are allowed.

☒ Claim(s) 21-25 and 34 is/are rejected.

☐ Claim(s) _____ is/are objected to.

☐ Claims _____ are subject to restriction or election requirement.

Application Papers

☐ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on _____ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some* ☐ None of the CERTIFIED copies of the priority documents have been
☐ received.

☐ received in Application No. (Series Code/Serial Number) _____.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

*Certified copies not received: _____

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

☒ Notice of References Cited, PTO-892

☐ Information Disclosure Statement(s), PTO-1449, Paper No(s). _____

☐ Interview Summary, PTO-413

☐ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

--- SEE OFFICE ACTION ON THE FOLLOWING PAGES ---

Art Unit: 2835

DETAILED ACTION

Response to Amendment

1. The present Office Action is responsive to Applicants' Amendment filed on October 14, 1999 (Certificate of Mailing date: October 12, 1999). The Examiner acknowledges the amendment to the Specification which restores the original text of US 5,483,421 (col.7: 7-19) that is the subject of the instant Reissue Application, and further acknowledges the cancelation of Claims 13-20 and 26-33. Claims 1-12, 21-25 and 34 remain pending in the instant Reissue Application and are ready for reconsideration. The Application number that corresponds to US 5,483,421 is 07/848,467 and will be hereinafter referred to as Application '467.
2. The Examiner further acknowledges and honors the Applicants' request for deferral of drawing corrections and delivery of the original letters patent pending notification of allowable subject matter.
3. Due to changes in the Office, the present Examiner has replaced Primary Examiner Donald A. Sparks as the Examiner of record of the instant Reissue Application as of the present Office Action.

Rejection Based Upon Recapture

4. Claims 21-25 and 34 are rejected under 35 USC § 251 as being an improper recapture of broadened claimed subject matter surrendered in the application for the patent upon which the present reissue is based. See *Hester Industries, Inc. v. Stein, Inc.*, 142 F.3d 1472, 46 USPQ2d 1641 (Fed. Cir. 1998); *In re Clement*, 131 F.3d 1464, 45 USPQ2d 1161 (Fed. Cir. 1997); *Ball Corp. v. United States*, 729 F.2d 1429, 1426, 221 USPQ 289,295 (Fed. Cir. 1984). A broadening

Art Unit: 2835

aspect is present in the reissue which was not present in the application for patent. The record of the application for the patent shows that the broadening aspect (in the reissue) relates to subject matter that applicant previously surrendered during the prosecution of the application. Accordingly, the narrow scope of the claims in the patent was not an error within the meaning of 35 USC § 251, and the broader scope surrendered in the application for the patent cannot be recaptured by the filing of the present reissue application.

Claims 21-23 and 34 are broader than the original patent claims by the following two limitations: (1) the requirement that the material of the chip carrier is a **“glass filled epoxy”** has not been included in these claims; and (2) the requirement of **“said chip carrier having a coefficient of thermal expansion of at least 17×10^{-6} ppm/C°”** has been completely left out of these claims.

Claims 24 and 25 are broader than the original patent claims in that the coefficient of thermal expansion of the chip carrier (i.e., **“at least 17×10^{-6} ppm/C°”**) has been completely left out of these claims.

It is the position of the present Examiner that the Applicants' Claims 21-25 and 34 are drawn to an invention surrendered during the prosecution in order to obtain allowance of the original patent claims. The Examiner draws attention to the original claims presented in US 5,483,421. Claims 1 and 7, *as originally filed* in patent Application '467, correspond to Claims 21 and 34, respectively, of the instant Reissue Application except that Reissue Claims 21 and 34 now each include the limitation **“an encapsulation material encapsulating said first set of solder connections.”** However, this limitation was not considered to be germane to the prior art rejection given in Application '467. This feature was taught by several references cited by

Art Unit: 2835

Examiner Sparks during prosecution of Application '467. A review of the prosecution history of Application '467 reveals that in the amendment dated May 26, 1993, Applicants presented the following amendments to Claim 1 (and to corresponding method Claim 7):

1. (Amended) A package mounting integrated circuit chips onto a circuit board comprising:
 - an integrated circuit chip having a surface array of input/output pads on one side thereof which array forms a footprint;
 - a chip carrier formed of an organic glass filled epoxy dielectric material having first and second opposite surfaces; said chip carrier having a coefficient of thermal expansion of at least 17×10^{-6} ppm/C°;
 - a first set of bonding pads formed on said first surface of the chip carrier and arranged in an array corresponding with the chip footprint;
 - a pattern of conductors on said chip carrier connected to accommodate said input/output pads;
 - a first set of solder connections interconnecting the input/output pads on the chip to said first set of bonding pads on the chip carrier;
 - an encapsulation material encapsulating said first set of solder connections;
 - a second set of bonding pads formed on the second surface of the chip carrier arranged in an array;
 - electrically conducting vias extend through the chip carrier connecting said first set of bonding pads to the second set of bonding pads;
 - a circuit board formed of an organic material having a coefficient of thermal expansion similar to the chip carrier;
 - a set of electrical connection sites formed on said circuit board and arranged in a pattern corresponding to the pattern of the array of the second bonding pads on said chip carrier;
 - a second set of solder connections interconnecting the pads of said second set of bonding pads on the chip carrier to the connection sites on the circuit board; and
 - wiring on said circuit board connected to said second set of bonding pads.

Additionally, Applicants repeatedly distinguished the amended (patented) claims of Application '467 over the prior art by arguing that the prior art fails to teach or suggest a **chip**

Art Unit: 2835

carrier made of glass filled epoxy FR-4 material which has a thermal coefficient of expansion of at least $17 \times 10^{-6} / ^\circ\text{C}$. In fact, the above argument appears to be the patentees' primary basis for distinguishing the broadest claims, independent Claims 1 and 7, from the prior art. Even more compelling is the fact that the Board of Patent Appeals and Interferences ("Board") were persuaded by the patentees' above-mentioned arguments and accordingly reversed the obviousness rejection made by Examiner Sparks based on the above arguments by the patentees. Portions of the Board's opinion dated June 14, 1995 are stated below:

Page 5, lines 6-8 of the Decision on Appeal

"...The deficiency of Ushifusa is that the CTE of the chip carrier and circuit board are disclosed to be in the range of $7-13 \times 10^{-6} \text{ ppm}/^\circ\text{C}$, whereas claim 1 specifically recites the CTE of these two elements to be at least $17 \times 10^{-6} \text{ ppm}/^\circ\text{C}$..."

Pages 6 and 7 of the Decision on Appeal

"...The bottom line in attempting to combine the teachings of Ushifusa with Europe '686 is that Ushifusa suggests that the solder joint between the chip carrier and the chip itself would never be able to withstand a chip carrier having a CTE of at least $17 \times 10^{-6} \text{ ppm}/^\circ\text{C}$..."

Page 8, lines 2-4 of the Decision on Appeal

Art Unit: 2835

“...Based upon the evidence before us, there is no suggestion to make the chip carrier and circuit board out of material having a CTE of at least 17×10^{-6} ppm/°C...”

Thereafter, the claims were allowed by Examiner Sparks and Application ‘467 matured into US Patent No. 5,483,421 on January 9, 1996.

Thus, it is clear from the prosecution history that the patentees presented arguments and made changes to the claims with respect to the subject matter of a chip carrier made of glass filled epoxy FR-4 material which has a thermal coefficient of expansion of at least 17×10^{-6} ppm/°C and surrendered claim scope that does not include the limitation of a chip carrier made of glass filled epoxy FR-4 material which has a thermal coefficient of expansion of at least 17×10^{-6} ppm/°C.

Accordingly, the Applicants’ exclusion from the Reissue Claims 21-25 and 34 of the “glass filled epoxy FR-4 material” limitation and the “glass filled epoxy FR-4 material which has a thermal coefficient of expansion of at least 17×10^{-6} ppm/°C” limitation makes the Reissue claims broader than the patent claims in this way and is prohibited by 35 USC § 251.

Examiner’s Remarks

5. The Examiner does not consider Claims 1-12 as indefinite because they lack an upper limit. As cited by the Applicants, *In re Johnson and Farnham*, 558 F.2d 1008, 194 USPQ 187 (1977) states on p.195 that “...it is the function of the specification, not the claims to set forth the

Art Unit: 2835

‘practical limits of operation’ of an invention” and “[o]ne does not look to the claims to find out how to practice the invention they define but to the specification.” (See p.3 of Applicants’ instant Amendment, Paper No.6). Accordingly, in the instant Reissue Application, Applicants’ Claims 1 and 7 (from patent 5,483,421) are deemed definite by the Examiner. However, the Examiner further notes that the *enforceable* CTE values are determined by the “practical limits of operation” clearly set forth in col.7: 15-19 of the Specification (i.e., “about $17-20 \times 10^{-6}$ ppm/°C”). Accordingly, the 35 USC § 112, first paragraph rejection of Claims 1-12 has been withdrawn.

6. In the remarks hereinbelow, the following CAFC cases have been referenced:

Ball Corp. v. United States, 729 F.2d 1429; 221 USPQ 289 (CAFC 1984); *Mentor Corp. v. Coloplast Inc.*, 998 F.2d 992, 27 USPQ2d 1521 (CAFC 1993); *In re Clement*, 131 F.3d 1464, 45 USPQ2d 1161 (CAFC 1997).

1) The Applicants correctly observe that Claims 21-25 and 34 are narrower than *originally filed* Claims 1 and 7, respectively, of Application ‘467 in that Claims 21-25 and 34 contain the further limitation of “an encapsulation material encapsulating said first set of solder connections.” However, as also noted by the Applicants on p.4, second paragraph of the instant Amendment (Paper No.6), and by Examiner Sparks in the rejection of Claims 21-25 and 34 under 35 USC § 251 (which has been essentially repeated above by the present Examiner), Claims 21-25 and 34 broaden the *patented* (i.e., amended) Claims 1 and 7 by omitting the requirements that the organic dielectric material for the chip carrier be *a glass filled epoxy* dielectric material and that

Art Unit: 2835

said chip carrier has *a coefficient of thermal expansion of at least $17 \times 10^{-6} / ^\circ\text{C}$* , thus, in the opinion of Examiner Sparks as well as of the present Examiner, effecting a recapture of the subject matter of original Claims 1 and 7 surrendered by amendment.

2) The Applicants assert that the above-cited encapsulation limitation is “material and significant” (p.4, third paragraph of Applicants’ instant Amendment, Paper No.6) and therefore sufficiently narrows Claims 21-25 and 34 to overcome recapture regardless of the broadening of the claims, as in *Ball* (p.5, third paragraph of Applicants’ instant Amendment).

The Examiner disputes the above assertion at 2):

Ball indicates, on p.296, section [9], that the broadening aspect must satisfy the condition that “the broader feature relates to an aspect of the invention that is not material to the alleged error supporting reissue” and again in section [10], “...we find that the non-material, broader aspects of *Ball*’s reissue claims do not deprive them of their fundamental narrowness of scope relative to the canceled claims. Thus, the reissue claims are sufficiently narrower than the canceled claims to avoid the effect of the recapture rule.”

However, in the Applicants’ instant Reissue Application, the broadening aspect of Claims 21-25 and 34 (i.e., the omission of the “*glass-filled epoxy*” limitation and the CTE limitation of “*at least $17 \times 10^{-6} / ^\circ\text{C}$* ”) is clearly the antithesis of “non-material” because these limitations were argued and appealed by the Applicants (and upheld by the Board of Patent Appeals and Interferences) as *material to patentability* in Application ‘467. Accordingly, the *Ball* decision does not support Applicants’ assertion that the narrowed scope of Claims 21-25 and 34 (by means

Art Unit: 2835

of the encapsulant limitation) overcomes recapture because, in fact, *Ball* requires that the broadening aspect be “non-material” and the broadening aspect of Claims 21-25 and 34 in the instant Reissue Application is **not** “non-material.”

3) The Applicants assert that “claims 21-25 and 34 of this application are sufficiently narrowed with respect to a fundamental aspect of the invention, to avoid the recapture rule, despite the broaden [sic] aspect of the claims” and that “a fundamental aspect of the invention” is the encapsulant (“the encapsulation limitation is material and significant”) because it is applied to organic chip carriers having “substantially higher” CTEs than the ceramic chip carriers in the prior art of record (see Applicants’ instant Amendment, *from* p.4, third paragraph *to* p.5, third paragraph).

The Examiner respectfully disagrees with Applicants’ above-mentioned assertion at 3) and argues as follows:

Clement, p.1165, succinctly summarizes the difference between *Mentor* and *Ball*:

“[2] [3] In both *Mentor* and *Ball*, the relevance of the prior art rejection to the aspects narrowed in the reissue claim was an important factor in our analysis. From the results and reasoning of those cases, the following principles flow: (1) if the reissue claim is as broad or broader than the canceled or amended claim in all aspects, the recapture rule bars the claim; (2) if it is narrower in all aspects, the recapture rule does not apply, but other rejections are possible; (3) if the reissue claim is broader in some aspects, but narrower in others, then: (a) if the reissue claim is as broad as or broader in an aspect germane to a prior art rejection, but narrower in another aspect completely unrelated to the rejection, the recapture rule bars the claim; (b) if the reissue claim is narrower in an aspect germane to prior art rejection, and broader in an aspect unrelated to the rejection, the recapture rule does not bar the claim, but other rejections are possible. *Mentor* is an example of (3)(a); *Ball* is an example of (3)(b).”

Art Unit: 2835

The Applicants, during prosecution of Application '467, never argued the narrowing encapsulant limitation as material to the patentability of the claims since several prior art references of record taught the same concept of an encapsulant applied to the solder connections between a chip and its carrier to relieve thermal stresses due to the difference between the chip CTE and the carrier CTE, *including the prior art reference US 4,825,284 awarded to Soga et al. and cited by the Applicants themselves in col.8: 11-14 of their own US patent 5,483,421 (subject of the instant Reissue Application)*, wherein the exemplary off-the-shelf encapsulant found in prior art reference US 4,825,284 (Soga et al., filed December 10, 1986) is used in the same stress relief application as that of the Applicants in US 5,483,421, except that Soga et al. uses the encapsulant between a chip and a ceramic (alumina or mullite) carrier; not an organic carrier (see Soga et al., col.6: 13-29). In fact, only the *type* of organic material for the carrier (i.e., glass-filled epoxy) and the *CTE values* (i.e., at least $17 \times 10^{-6}/^{\circ}\text{C}$), as amended in Claims 1 and 7 of Application '467, were argued as patentable over the prior art of record by the Applicants and found to be so by the Board. Accordingly, Applicants' instant reissue Claims 21-25 and 34 appropriately fall into the category of 3(a) (*Mentor*) rather than 3(b) (*Ball*), as described in the above citation from *Clement*; i.e., reissue Claims 21-25 and 34 are "broader in an aspect germane to a prior art rejection, but narrower in another aspect completely unrelated to the rejection" and therefore "the recapture rule bars the claim[s]."

Art Unit: 2835

Allowable Subject Matter

7. Claims 1-12 have been allowed.
8. As allowable subject matter has been indicated, Applicants' reply must either comply with all formal requirements or specifically traverse each requirement not complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following references teach an encapsulation material encapsulating the solder connections between a chip and its carrier for reducing thermal stresses on the connections due to a difference between chip CTE and carrier CTE:

- a) Ushifusa (US 4,821,142), col.2: 67-col.3: 1; col.5: 1-18.
- b) Soga et al. (US 4,825,284), col.6: 13-29 (teaches a quartz-filled epoxy as in Applicants' US 5,483,421 under Reissue.
- c) Kodama et al. (US 5,045,922), col.14: 14-23.
- d) Grebe et al. (US 5,274,913), col.1: 5-18 and 60-63; col.6: 38-48.
- e) Soga et al. (JP02-2151A), English language Abstract (teaches a quartz-filled epoxy as in Applicants' US 5,483,421 under Reissue).

Art Unit: 2835

f) Soga et al. (JP02-83963 A), English language Abstract (teaches thermal stress reducing encapsulant 7 between ceramic board 1 and organic board 2).

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Vigushin whose telephone number is (703) 308-1205. The examiner can normally be reached on Monday to Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo P. Picard, can be reached on (703) 308-0538. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1782.

John B. Vigushin
Assistant Examiner
February 24, 2000



Leo P. Picard
Supervisory Patent Examiner
Technology Center 2800